

REMARKS/ARGUMENTS

The present Amendment is in response to the Office Action having a mailing date of September 26, 2006. Claims 1-3, 6-11, and 14-20 are pending in the present Application. Applicant has amended claims 1, 11, and 17. Applicant has also canceled claims 7 and 20. Consequently, claims 1-3, 6, 8-11, and 14-19 remain pending in the present Application.

Applicant has amended claim 1 to recite that the first and second nonferromagnetic layers are between the first and second ferromagnetic layers and between the second and third ferromagnetic layers, respectively. Support for the amendment may be found in FIG. 3 and paragraphs 16-19 of the present application. Applicant has amended claim 17 to recite that the first and second portions of the third ferromagnetic layer are proximate to the first and second ferromagnetic layers, while the third portion is distal from the first and second ferromagnetic layers. Support for the amendment may be found in FIG. 3 and paragraphs 16-19 of the present application. Applicant has also amended claim 1 to recite that the first antiferromagnetic layer that is adjacent to the first ferromagnetic layer has a high blocking temperature, while the second antiferromagnetic layer adjoining the third ferromagnetic layer has a low blocking temperature. Applicant has amended claim 11 to recite that the second antiferromagnetic layer in the bias structure has a low blocking temperature, while the first antiferromagnetic layer in the pinning structure has a high blocking temperature. Applicant has also amended claim 17 to recite that the first antiferromagnetic layer adjacent to the first and second ferromagnetic layers has a low blocking temperature, while the second antiferromagnetic layer adjacent to the fourth ferromagnetic layer has a high blocking temperature. Consequently, claims 1, 11, and 17 recite that the blocking temperature of the antiferromagnetic layer used in biasing the free layer is lower than the blocking temperature of the antiferromagnetic layer used in pinning the pinned layer. Support for the

amendment may be found in the specification, paragraph 28. Accordingly, Applicant respectfully submits that no new matter is added.

In the above-identified Office Action, the Examiner rejected claims 7 and 20 under 35 U.S.C. § 112, first paragraph, because the specification “does not reasonably provide enablement for two sets of first and second antiferromagnetic layers.”

Applicant has canceled claims 7 and 20. Accordingly, Applicant respectfully submits that the Examiner’s rejection is moot.

The Examiner also rejected claims 1-3 and 8-11, and 14-17 under 35 U.S.C. § 103 as being unpatentable over WO 2001-03130A1 or U.S. Patent No. 6,501,627 (Noma) in view of U.S. Patent No. 5,287,238 (Baumgart).

Applicant respectfully traverses the Examiner’s rejection. Independent claims 1, 11, and 17 all recite the use of first and second ferromagnetic layers, which have different blocking temperatures. Claims 1, 11, and 17 further recite that the antiferromagnetic layer used in biasing the free layer (“biasing antiferromagnetic layer”) has a lower blocking temperature than the antiferromagnetic layer used in pinning the pinned layer (“pinning antiferromagnetic layer”). Because the biasing antiferromagnetic layer has a lower blocking temperature, damage to the magnetic sensor may be reduced or avoided. Specification, paragraph 28

In contrast, Noma in view of Baumgart fails to teach or suggest a sensor in which the biasing antiferromagnetic layer has a low blocking temperature, while the pinning antiferromagnetic layer has a high blocking temperature. As discussed in the previous response and acknowledged by the Examiner, Noma fails to disclose the differences in blocking temperatures for the different antiferromagnetic layers. Consequently, the Examiner relied upon

Baumgart to teach that two AFM layers in different locations may have different blocking temperatures in order to facilitate pinning the individual layers separately.

Baumgart describes a system with two pinned layers having their magnetizations pinned in opposite directions. Baumgart, col. 7, lines 17-32. Consequently, Baumgart describes utilizing antiferromagnetic layers having different blocking temperatures so that the pinned layers can have their magnetizations set independently. Baumgart, col. 7, line 63-col. 8, line 1. However, Applicant can find no mention in Baumgart that the blocking temperature of the biasing antiferromagnetic layer can or should be less than the blocking temperature of the pinning antiferromagnetic layer. Consequently, Baumgart fails to teach or suggest this feature.

Because both Baumgart and Noma fail to teach or suggest that the biasing antiferromagnetic layer has a low blocking temperature, while the pinning antiferromagnetic layer has a high blocking temperature, any combination of Noma and Baumgart fail to teach or suggest this feature. In particular, if the teachings of Baumgart were combined with that of Noma, different blocking temperature may be used for different antiferromagnetic layers. However, the biasing antiferromagnetic layer need not have a lower blocking temperature than the pinning antiferromagnetic layer. Consequently, Noma in view of Baumgart fail to teach or suggest the sensors recited in independent claims 1, 11, and 17. Accordingly, Applicant respectfully submits that claims 1, 11, and 17 are allowable over Noma in view of Baumgart.

Claims 2-3 and 8-10 depend upon independent claim 1. Claims 14-15 depend upon independent claim 11. Consequently, the arguments herein apply with full force to claims 2-3, 8-10, and 14-15. Accordingly, Applicant respectfully submits that claims 2-3, 8-10, and 14-15 are allowable over Noma.

In the above-identified Office Action, the Examiner also rejected claims 1-3, 6-11, and 14-20 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,462,919 (Mack) as evidenced by U.S. Patent Application Publication No. 2001/0050859 (Schwarzl) in view of Baumgart.

Applicant respectfully traverses the Examiner's rejection. As discussed above, independent claims 1, 11, and 17 all recite that the blocking temperature of the biasing antiferromagnetic layer is lower than the blocking temperature of the pinning antiferromagnetic layer.

In contrast, as the Examiner has acknowledged, Applicant can find no mention in Mack of the antiferromagnetic layers having different blocking temperatures. Consequently, the Examiner relied upon Baumgart for this feature. As discussed above, Baumgart also fails to teach or suggest that the blocking temperature of the biasing antiferromagnetic layer can or should be less than the blocking temperature of the pinning antiferromagnetic layer.

Because both Baumgart and Mack fail to teach or suggest that the biasing antiferromagnetic layer has a low blocking temperature, while the pinning antiferromagnetic layer has a high blocking temperature, any combination of Mack and Baumgart fail to teach or suggest this feature. In particular, if the teachings of Baumgart were combined with that of Mack, different blocking temperature may be used for the biasing and pinning antiferromagnetic layers used in Mack. However, the biasing antiferromagnetic layer need not have a lower blocking temperature than the pinning antiferromagnetic layer. Consequently, Mack in view of Baumgart fail to teach or suggest the sensors recited in independent claims 1, 11, and 17. Accordingly, Applicant respectfully submits that claims 1, 11, and 17 are allowable over Mack in view of Baumgart.

Claims 2-3 and 6-10 depend upon independent claim 1. Claims 12 and 14-16 depend upon independent claim 11. Claims 18-20 depend upon independent claim 17. Consequently, the arguments herein apply with full force to claims 2-3, 6-10, 12, 14-16, and 18-20. Accordingly, Applicant respectfully submits that claims 2-3, 6-10, 12, 14-16, and 18-20 are allowable over the cited references.

Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,

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Date

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